Info card

Inductive sensors with IO-Link

This info card serves as a supplement to the main position sensors catalogue and to the individual data sheets. For further information and contact addresses please visit our website at www.ifm.com.

Intended use

While in use the products are exposed to influences which may have an effect on function, life, quality and reliability of the product.

It is the customer’s responsibility to ensure that the products are suitable for the intended application. This applies in particular to applications in hazardous areas and with adverse environmental influence such as pressure, chemicals, temperature fluctuations, moisture and radiation as well as mechanical stress, especially if the products are not installed properly.

Using the products in applications where the safety of people depends on the function of the product is not permitted. Non-compliance may result in death or serious injuries.

Operating principle of an inductive proximity switch with IO-Link

Coil and capacitor form an LC resonant circuit, also called basic sensor.

If a target penetrates the sensor field, eddy currents are generated in the target, taking away energy from the sensor. The circuit ensures that even when a target is in contact with the sensor a process value is provided depending on the distance.

1. Connection
2. Housing
3. Downstream electronics
4. Capacitor
5. Coil
6. Alternating electromagnetic field = active zone
7. Target = electrically conductive material
8. Ideal direction of movement of the target

Glossary of important terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Active zone</td>
<td>Area above the sensing face in which the sensor reacts to the approach of the target.</td>
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<tr>
<td>Number of switching operations</td>
<td>0...65535 -&gt; starts again at 0 when the maximum value has been reached.</td>
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<td>Output function</td>
<td>Normally open: Object within the active zone &gt; output supplied with current.</td>
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<tr>
<td></td>
<td>Normally closed: Object within the active zone &gt; output not supplied with current.</td>
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<td></td>
<td>Parameterisable: Choice between normally closed or normally open.</td>
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<td></td>
<td>Positive switching: Positive output signal (to L-).</td>
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<td></td>
<td>Negative switching: Negative output signal (to L+).</td>
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Switch-off delay

Can be set in steps of 100 ms.

Rated insulation voltage

DC units with protection class III: 60 V DC

Rated short-circuit current

For short-circuit-proof units: 100 A

Rated impulse withstand voltage

DC units with protection class III: 0.8 kV (à overvoltage category II)

Power-on delay time

The time the sensor needs to be ready for operation after application of the operating voltage (in the millisecond range).

Switching frequency

Damping with standard target at half the final value of the sensor. The circuit ensures that even when a target is in contact with the sensor a process value is provided depending on the distance.

Switching frequency

Damping with standard target at half the final value of the measuring range (Sn).

The ratio damped to undamped (tooth to gap) = 1 : 2.

Number of switching operations

0...65535 -> starts again at 0 when the maximum value has been reached.

Active zone

Area above the sensing face in which the sensor reacts to the approach of the target.

Switch-off delay

Can be set in steps of 100 ms.

Switch point drift

The shifting of the switch point if the ambient temperature changes.

Switching frequency

Damping with standard target at half the final value of the measuring range (Sn).

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Correction factors

With materials and sizes deviating from the standard target the short range signal via IO-Link cannot be guaranteed.

Representation of the process value with measuring range and setting range with front damping

Approach and ranges (valid for structural steel, e.g. S235JR)

- Distance to the background
- Recommended target distance in SIO mode
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Switch point definition IO-Link

Single point mode (presence detection) to smart sensor profile 2

Normally open: (switch point logic = 0)
- SP1 switch-on point
- SP1 + H switch-off point

Normally closed: (switch point logic = 1)
- SP2 switch-on point
- SP2 - H switch-off point

Window mode (presence detection) to smart sensor profile 2

Normally open: (switch point logic = 0)
- SP1 switch-on point
- SP1 + H switch-off point

Normally closed: (switch point logic = 1)
- SP2 switch-on point
- SP2 - H switch-off point

Two point mode (presence detection) to smart sensor profile 2

Normally open: (switch point logic = 0)
- SP1 switch-off point
- SP2 switch-on point

Normally closed: (switch point logic = 1)
- SP1 switch-on point
- SP2 switch-off point

Condition:
- SP1 > SP2 + 3% and SP1 between 400 and 3800 and SP2 between 388 and 3686

SP switch point
H hysteresis
SSC switching signal channel
PDV process data variable
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Tips on flush and non-flush mounting in metal

Installation instructions cylindrical designs
Flush: Non-flush:

Installation instructions rectangular designs
Flush: Non-flush:

Minimum clearance for installing units of the same type (side-by-side installation)
Applies to cylindrical and rectangular sensors.

The minimum distance between units may only be disregarded for units with different oscillator frequencies or different sensing principles.

Connection systems

The unit must be connected by a qualified electrician.

3-wire technology (negative or positive switching)

Pin configuration of the US-100 connectors (view onto the plug at the unit)

Colours:
Pin 1: BN; Pin 3: BU; Pin 4: BK
BN: brown; BU: blue

IO-Link diagnostic data

Process value above the valid range Warning
Process value below the valid range Warning
Hardware failure in the device (e.g. sensor head damaged) Error message